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## Maltreatment Subtypes, Depressed Mood, and Anhedonia: A Prospective Study with Adolescents

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### Abstract

**Objective:** Maltreatment exposure is a robust predictor of adolescent depression. Yet, despite this well-documented association, few studies have simultaneously examined how maltreatment subtypes relate to qualitatively distinct depressive symptoms. The present multi-wave, longitudinal study addressed this gap in the literature by examining how different maltreatment subtypes independently impact depressed mood and anhedonia over time in a diverse adolescent sample.

**Method:** 673 adolescents ( $Age_{Mean}=14.83$ ;  $Age_{SD}=0.66$ ; 57.1% female; 32.8% Hispanic, 30.4% Caucasian; 25.0% African-American) completed self-report inventories for child maltreatment and annual self-report measures of depressed mood and anhedonia over the course of six years. We used latent growth curve modeling to test how maltreatment-exposure predicted anhedonia and depressed mood, and whether these relations differed as a function of sex and/or race/ethnicity.

**Results:** Overall, both emotional abuse ( $p < .001$ ) and neglect ( $p = .002$ ) predicted levels of depressed mood over time, while only emotional neglect predicted levels ( $p < .001$ ) and trajectories ( $p = .001$ ) of anhedonia. Physical and sexual abuse did not predict depressive symptoms once accounting for emotional abuse and neglect ( $p = ns$ ). These findings were largely invariant across sex and race.

**Conclusions:** Findings suggest that the consequences of emotional neglect may be especially problematic in adolescence due to its impact on both depressed mood and anhedonia, and that emotional abuse's association with depression is best explained via symptoms of depressed mood. These findings are congruent with recent findings that more "silent types" of maltreatment uniquely predict depression, and that abuse and neglect experiences confer distinct profiles of risk for psychological distress.

### Keywords

Maltreatment; Depression; Anhedonia; Adolescence; Longitudinal Data Analysis

Approximately 40% of youth experience childhood abuse or neglect by age 18 (Kim, Wildeman, Johnson-Reid, & Drake, 2017). Child maltreatment-exposure is associated with poor health outcomes that emerge early in life and persist across the lifespan (Norman, Byambaa, Butchart, Scott, & Vos, 2012). One of the more well-documented consequences of childhood maltreatment is depression (Cohen, Menon, Shorey, Le, & Temple, 2017; Liu, 2017). Youth exposed to abuse or neglect are twice as likely to develop depression compared to the average risk for onset (Li, D'Arcy, & Meng, 2016). Further, maltreatment-exposure predicts a more chronic, treatment-resistant, and severe depression course compared to individuals with depression but without a maltreatment history (Nanni, Uher, & Danese, 2012). While the association between physical/sexual abuse and depression is well-documented, recent findings suggest that more "silent types" of maltreatment (i.e., emotional abuse/neglect) confer unique depression risk, especially during the vulnerable adolescent transition (Infurna et al., 2016). These findings have led to renewed interest in specifying how distinct maltreatment subtypes correspond to depression risk.

In addition to distinguishing between maltreatment subtypes, it is increasingly important to differentiate between symptoms of depression, namely, depressed mood and anhedonia. Depressed mood is comprised of feelings of sadness and is a component of the broader construct of negative affect (Watson & Clark, 1984). Meanwhile, anhedonia is characterized as a lack of positive affect and low levels of pleasurable engagement with the environment (Hasler, Drevets, Manji, & Charney, 2004). Importantly, the growth of depressed mood and anhedonia are independent during adolescence (Conway, Zinbarg, Mineka, & Craske, 2017), forecast unique courses of resilience and psychological distress (Gabbay et al., 2015), and correspond to distinct profiles of risk (Hasler et al., 2004). For instance, within a motivational context, deficits in the approach system are typically associated with anhedonic symptoms, while hypervigilance in the avoidance system is more closely related to negative or depressed mood states (Carver, 2006; Trew, 2011). Thus, treating depression as a unitary construct may obscure important individual differences that exist in the etiology of anhedonia and depressed mood respectively.

To date, few studies have simultaneously examined how qualitatively distinct symptoms of depression are associated with different maltreatment subtypes. Lumley and Harkness (2007) found that both emotional maltreatment and physical abuse, but not sexual abuse, was correlated with low positive (i.e., anhedonia) and negative affect (i.e., depressed mood). A limitation of this study, however, is that it did not differentiate between emotional abuse and neglect. Recent research suggests that neglect and abuse may correspond to distinct profiles of underlying risk for psychological distress. For instance, relevant to depression, threatening experiences (e.g., abuse) may be characterized by dysregulation in the avoidance system, while deprivation-exposure (e.g., neglect) is posited to confer risk via deficits in the approach system (McLaughlin, Sheridan, & Lambert, 2014; Pollak, Cicchetti, Hornung, & Reed, 2000). Thus, it may be necessary to distinguish between these adversities when examining the consequences of emotional maltreatment. To our knowledge, only one study has previously looked at anhedonic and depressed mood secondary to experiences of emotional abuse and neglect. In a large, cross-sectional study, Van Veen and colleagues (2013) found that only emotional neglect-exposure was associated with anhedonic

symptoms. Meanwhile, sexual abuse, emotional abuse, as well as emotional neglect, were linked with depressed mood.

The present study seeks to build on Lumley and Harkness's (2007) and Van Veen and colleagues' (2013) studies to provide insight into how different maltreatment subtypes may impact depressed mood and anhedonia over time. First, similar to Lumley and Harkness (2007) our study examined the relation between maltreatment and depression during adolescence. Past meta-analytic findings show the association between maltreatment and depression to be especially strong at this developmental stage (Infurna et al., 2016). This may be due retrospective assessments of childhood adversities being temporally closer compared to studies with adults or because adolescence is a sensitive developmental period for depression (Garber & Rao, 2014). From a psychobiological perspective, exposure to maltreatment may lead to structural and functional differences at the neural level that underlie emotion regulation, planning, and perspective taking (McCrory, Gerrin, & Viding, 2017). Consistent with an organizational perspective of development (Cicchetti & Toth, 2009), these neural deficits, associated with cognitive and affective functioning, can interfere with mastering salient tasks in adolescence related to autonomy and social development. Within middle to late adolescence, depressive symptoms may be a common psychological response when struggles with these developmental challenges persist (Cicchetti & Toth, 2009), potentially due to these neurobiological deficits. As depressive presentations tend to be continuous from adolescence through adulthood (Harrington, Rutter, & Fombonne, 1996), identifying how maltreatment subtypes impact anhedonia and depressed mood during this developmental stage is important for understanding patterns of trauma-related depressive symptoms across the lifespan.

We sought to also extend past research by testing the association between maltreatment and depression in a large, diverse sample of adolescents, allowing us to examine potential moderating influence of sex and race/ethnicity. There are several theoretical reasons why certain individuals may be more sensitive to certain maltreatment subtypes. With regard to sex, etiological depression models suggest that girls with a maltreatment history should demonstrate elevated levels of depressive symptoms due to a wide array of intrapersonal and environmental risk factors impacting reactivity to past stressful life events (Hankin & Abramson, 2001). However, to date, findings are mixed as to whether girls and boys report dissimilar mental health responses when exposed to similar levels of maltreatment (Arnow et al., 2011; Danielson et al., 2005). Cumulative approaches to maltreatment and mental health may contribute towards these disparate findings. For instance, it may be that girls report heightened depressive symptoms following commissions of abusive behaviors, as opposed to omissions of supportive behavior, due to their tendency to ruminate about negative life events (Nolen-Hoeksema, 2001). Further, as boys and girls vary in anhedonic compared to depressed mood responses (Bennett et al., 2005) it may be that sex differences can only be identified when examining qualitatively distinct depressive symptoms.

With regard to race/ethnicity, different theories abound as to whether certain cultural groups may be more sensitive or resilient to maltreatment-exposure. "Double jeopardy" theories suggest that due to racial/ethnic minorities being exposed to more chronic patterns of stress early in life, these adolescents are more sensitive to patterns of maltreatment (Pearlin,

Scheiman, Fazio, & Meersman, 2005). Meanwhile, “resilience” theories (Widom, Czaja, Wilson, Allowood, & Chauhan, 2013), posit that racial/ethnic minority youth are less likely to experience trauma-related symptoms due to more developed coping strategies, as well as culturally-relevant protective factors (e.g., extended kinship networks; Putnam-Hornstein et al., 2013). Alternatively, “racial invariance” hypotheses suggest that responses to interpersonal trauma will be equal across racial groups. To date, studies that have explicitly tested “double jeopardy”, “resilience”, and “racial invariance” theories have found support varied as a function of outcome (Widom et al., 2013). To our knowledge, no study has simultaneously examined these hypotheses with regard to adolescent depressed mood and anhedonia.

Finally, our study extends prior work (Lumley & Harkness, 2007; Van Veen et al., 2013) by examining trajectories of anhedonic and depressed mood responses stemming from childhood maltreatment within the context of a multi-wave, longitudinal design. Multiple assessments of depression allow us to examine how maltreatment experiences may differentially impact levels of depressive symptoms at baseline (i.e., the intercept), as well as the growth of symptoms (i.e., the slope). Examining the trajectory of symptoms can provide insight into whether the deleterious consequences of a maltreatment experience fade over time (i.e., a negative, linear slope), exacerbate as one ages into a sensitive developmental period (i.e., a positive, linear slope), or remains constant (i.e., a significant intercept, non-significant slope) across development. This level of specificity has translational implications for the timing of trauma-focused clinical protocols for adversity-exposed adolescents.

Overall, we hypothesized that maltreatment subtypes would differentially relate to depressed mood and anhedonia. First, we expect that neglect would uniquely relate to symptoms of anhedonia. This hypothesis is based on past research suggesting that neglect is uniquely associated with risk in the approach system that underlies anhedonia (e.g., Hanson, Hariri, & Williamson, 2015), as well as Van Veen and colleagues’ (2013) findings concerning anhedonia and neglect in adults. Due to the relatively stable nature of anhedonia in middle to late adolescence (Conway et al., 2017), we hypothesized that neglect would only be associated with elevated levels of anhedonia over time (i.e., positive intercept; non-significant slope). Further, we hypothesized that neglect would be associated with depressed mood based on past research with adults (Van Veen et al., 2013), as well as neglect’s theoretical link with the avoidance system (Bowlby, 1973) that underlies depressed mood (Carver, 2006; Trew, 2011). However, unlike anhedonia, we predicted other abusive experiences (i.e., emotional, physical, and sexual) would also be associated with depressed mood due to those experiences also being associated with facets of the avoidance system (McLaughlin et al., 2014). As depressive symptoms increase during the transition from middle to late adolescence (Hankin et al., 1998), we hypothesized that all maltreatment experiences would be a predictor of these increasing trajectories. Finally, exploratory analyses examined how these hypothesized relations varied as a function of sex or race/ethnicity.

## Method

### Participants and Procedure

Participants in the present study were recruited as part of a larger study examining adolescent health behaviors. Students, mostly freshmen and sophomores in high school, were recruited during school hours in classes with mandated attendance. For a total of 6 years, students completed annual assessments concerning socioemotional and behavioral functioning, as well as environmental risk and protective factors. Students completed measures via paper-pencil at their respective schools until they no longer attended (e.g., dropped out, graduated), after which surveys were completed online. Incentives for participating in the study ranged from \$10–\$30 gift cards for each assessment. Written parental consent and student assent were obtained prior to administering surveys. Students were re-consented upon turning 18 years old. If adolescents missed a given wave of data collection, the investigative team first attempted to contact the individual via phone (voice and text), then email, and as a last resort by mail. All study procedures were approved by an Institutional Review Board.

A total of 1,042 adolescents were recruited to be part of the original study described above. When participants turned 18, as part of their annual assessment, they completed a measure of childhood maltreatment. In total, 673 adolescents ( $Age_{Mean}=14.83$ ;  $Age_{SD}=0.66$  at baseline) completed the maltreatment history questionnaire and were included in the present study. The use of annual, prospective depression assessments, followed by a retrospective maltreatment report, has significant methodological advantages including assessing the mental health consequences of maltreatment during adolescence in a sample not explicitly receiving some form of intervention (Kendall-Tackett & Becker-Blease, 2004). In the present study, 57.7% of the participants were female ( $N=388$ ), while 30.4% of the sample was White ( $N=204$ ), 25.0% was Black/African-American ( $N=168$ ), and 32.8% was Hispanic-American ( $N=220$ ), 12.0% ( $N=81$ ) of the sample either identified as bi-racial, Asian-American, or did not identify with any race. Due to sample size constraints, analyses concerning race/ethnicity were limited to Whites, Black/African-Americans, and Hispanic-Americans. Overall, 51% of adolescents completed all waves of data collection, and 93% of individuals completed at least 4 annual assessments.

## Measures

### Childhood Maltreatment.

Child abuse and neglect were measured with the Childhood Trauma Questionnaire-Short Form (CTQ-SF; Bernstein et al., 2003). The CTQ-SF is a 28-item measure with items asking participants to rate their childhood experiences on a scale of 1 (*never true*) to 5 (*very often true*). The measure demonstrated good criterion-related validity in adolescents (Bernstein et al., 2003) and is the most widely used measure in research for assessing childhood maltreatment (Baker & Festinger, 2011). The original CTQ-SF posited five subscales: Emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. However, repeated research has found low levels of reliability for the physical neglect subscale (e.g., Paivio & Cramer, 2004). Therefore, consistent with other research (e.g.,

White, Brogdan, Fisher, Munoz, Williamson, & Hariri, 2002) we only focused on the emotional neglect subscale in the present study. The CTQ-SF exhibited adequate reliability across subscales: Emotional abuse ( $\alpha = 0.84$ ), physical abuse ( $\alpha = 0.72$ ), sexual abuse ( $\alpha = 0.95$ ), and emotional neglect ( $\alpha = 0.87$ ).<sup>1</sup>

### Depression Symptoms.

Depression symptoms were measured at each wave with the Center for Epidemiologic Studies Depression Scale (CESD)-10 (Kohut, Berkman, Evans, & Cornoni-Huntley, 1993). The 10-item measure asked participants to indicate on a scale of 0 (rarely or none of the time) to 3 (all of the time) how often they experience symptoms of depression. CESD-10 has comparable internal reliability and validity compared to the original 20-item CESD measure (Kohout et al., 1993) and is a psychometrically sound self-report measure for depression in adolescent populations (Bradley et al., 2010). Similar to the original 20-item CES-D measure, the shortened 10-item version is also comprised of subscales for specific depressive symptom clusters. For the present study, we used a two-factor solution consisting of an 8-item depressed mood subscale and a 2-item anhedonia subscale (“I felt hopeful about the future”, “I was happy”). This two-factor structure of the CES-D-10 has shown adequate fit in prior research (Cheng, Chan, & Fung, 2006). Internal consistency for each subscale for the two-factor structure was similar to past research (depressed mood,  $\alpha = 0.82$ ; anhedonia,  $\alpha = 0.57$ ) (Cheng et al., 2006). Average test-retest reliability for the anhedonia and depressed mood subscales were  $r = .38$  (range: 0.29–0.43) and  $r = 0.53$  (range: .46–.58) respectively.

### Data Analysis Design

Little’s (1988) missing completely at random (MCAR) test was initially conducted to understand the nature of our missing data with regard to total scores over time. Further, independent samples *t*-tests were conducted to examine whether adolescents who completed all waves of data collection differed from those with missing data. If non-significant, data was imputed using full information maximum likelihood (FIML), an optimal method for reducing bias in missing data relative to other estimation methods (Enders & Bandalos, 2001). Next, we tested a dual-domain latent Growth Curve (LGC) model following standard procedures (Byrne, 2012) with MPlus (7.1; Muthen & Muthen, 2010) to examine inter and intraindividual changes of depressed mood and anhedonia. The first factor, the intercept, represents the mean level of symptoms at baseline (intercept mean) and individual differences in baseline symptoms (intercept variance). Since the intercept is a constant for any given individual across time, factor loadings were set at 1 for each wave. The second factor, the slope, describes the individual’s rate of change over time (slope mean) and differences between individuals in rate of change (slope variance).

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<sup>1</sup>An alternative solution to handling low levels of reliability associated with physical neglect is to include a composite score of physical and emotional neglect as a subscale (e.g., Menon, Cohen, Shorey, & Temple, 2018). Initial confirmatory factor analyses (CFAs) were therefore conducted to examine whether a 4-factor structure with emotional neglect or a composite neglect subscale better fit the data. Findings suggested that the final solution with emotional neglect as a subscale provided an adequate fit to the data ( $X^2/df = 2.56$ ; CFI = .99; RMSEA = .04; WRMR = 0.98), while the final 4-factor solution with a composite neglect subscale did not ( $X^2/df = 4.91$ ; CFI = .97; RMSEA = .07; WRMR = 1.66). Both solutions provided a better fit compared to the original 5-factor solution of the CTQ-SF ( $X^2/df = 5.04$ ; CFI = 0.97; RMSEA = .07; WRMR = 1.63). Please contact the first author for further details.

To test which growth pattern best fit the data, factor loadings for slope were fixed at values corresponding to a linear (0, 1, 2, 3, 4, 5), quadratic (0, 1, 4, 9, 16, 25), and cubic (0, 1, 8, 27, 64, 125) time scale. Increases of 10 within the BIC was used as a cutoff to determine if higher ordered growth patterns outperformed the simpler linear function. Once the best fitting pattern for depressed mood and anhedonia were established, we entered our four maltreatment subtypes into our models and direct effects on the intercept and slope of our two main outcomes were inspected. To help control for the number of analyses, significance was set at .01 a-priori. Model fit indices for these LGC models were CFI = 0.95, RMSEA = 0.06, SRMR = 0.08, and  $X^2/df < 3.00$ .

Last, demographic differences were examined both on our symptom outcomes, as well as within the context of maltreatment subtypes. Gender was coded as a binary variable (Female=0; Male=1) while three dummy code variables were created for race/ethnicity (White, Black, and Hispanic). When entered as an independent variable within our LGC models, a significant effect can be interpreted as the intercept or slope varies as a function of sex or race (e.g., females, compared to males, experience elevated depressed mood). When entered within an interaction term with maltreatment subtype, a significant interaction can be understood as the relation between maltreatment exposure and depressive symptoms varies as a function of sex or race.

## Results

Descriptive statistics for all study variables are presented in Table 1. Findings from Little's MCAR test suggested that the data was missing completely at random ( $X^2(1838) = 127.38, p > .99$ ). Relatedly, independent samples *t*-tests suggested that none of our main predictors (i.e., maltreatment subtypes) nor outcomes (i.e., depressed mood and anhedonia) varied as a function of completion status ( $p > .01$ ). Thus, data were estimated using FIML. We next tested whether the growth of depressed mood and anhedonia was linear, quadratic, or cubic. For depressed mood symptoms, a quadratic model corresponded to the lowest BIC (13157.34); however, this was only 0.41 less than the linear model (BIC=13157.75). Similarly, the cubic model provided the best fit for anhedonic symptoms (BIC=8646.80); however, this was only a 1.03 BIC improvement over the linear model (BIC=8647.83). Therefore, linear growth models were applied to both dependent variables.

LGC models with maltreatment subtypes entered as covariates were next tested. Our model exhibited acceptable fit ( $X^2/df=1.83$ ; CFI=.95; RMSEA=.04; SRMR=0.04). Of note, only emotional neglect positively predicted both the intercept ( $p<.0001$ ) and slope ( $p<.001$ ) for anhedonic symptoms. depressed mood, emotional abuse ( $p<.0001$ ) and emotional neglect ( $p=.002$ ) were the only predictors of elevated baseline levels, while none of the predictors related to the slope ( $p > .20$ ). These findings are displayed in Figure 1. The covariance matrix (Table 1) and estimated/actual means (Figure 1), with sex and race entered as covariates, for this model are presented in the appendix along with the parameter estimates for significant and non-significant findings in our model (Table 2 in the supplemental material). As seen in Figure 1 in the appendix, there was little change in the sample's average levels of anhedonia and depressed mood annually, which is consistent with the larger adolescent depression literature (Conway et al., 2017).

Finally, we examined the influence of sex and race/ethnicity on our outcomes. We first tested if symptoms varied overall in our sample, and found that girls reported elevated levels of depressed mood at baseline ( $\beta = -0.24$ ;  $SE = 0.04$ ;  $t = -5.50$ ,  $p < .001$ ). We did not find any other direct relations between demographics and depressive outcomes ( $p > .01$ ). Next, the moderating influence of race was tested on the relation between maltreatment and depression. African-Americans reported elevated anhedonic symptoms at baseline within the context of elevated emotional abuse ( $\beta = 0.23$ ;  $SE = 0.11$ ;  $t = 2.91$ ,  $p < .01$ ) as well as physical abuse ( $\beta = 0.49$ ;  $SE = 0.14$ ;  $t = 3.60$ ,  $p < .001$ ). However, the slope for the association between anhedonia and physical abuse for African-Americans in our sample decreased over time ( $\beta = -0.69$ ;  $SE = 0.22$ ;  $t = -3.04$ ,  $p = .002$ ), suggesting that elevated symptoms at baseline may regress to the mean. All other interactions between sex/race and maltreatment subtypes were non-significant ( $p > .01$ ).

## Discussion

One of the more robust findings in the depression literature is the deleterious consequences of maltreatment across the lifespan (Liu, 2017; Norman et al., 2012). Recent findings suggest that emotional maltreatment in particular may confer depressogenic risk, especially in adolescents (Infurna et al., 2016). Our study sought to extend these findings by distinguishing between forms of emotional maltreatment (i.e., abuse and neglect) as well as symptoms of depression (i.e., depressed mood and anhedonia). Overall, our findings are congruent with Infurna and colleagues (2016) such that emotional abuse and neglect were the only maltreatment subtypes that uniquely related to elevated depressive symptoms. Further, we extended these findings by showing that the consequences of emotional neglect may be especially problematic in adolescence due to its impact on both depressed mood and anhedonia. These results, among others from our study, reiterate the importance of distinguishing between childhood adversities and symptom clusters when characterizing the relation between maltreatment and depression.

Chronic stress, including childhood adversities, is a well-documented risk factor for anhedonia (e.g., Berenbaum & Connelly, 1993). Pizzagalli (2014) offers a biopsychological explanation for this association in which early exposure to childhood adversities blunts dopaminergic pathways, subsequently leading to anhedonic responses. Coupled with past research (Hanson et al., 2015; Van Veen et al., 2013), our findings have interesting implications for clarifying this pathway within Pizzagalli's (2014) model. It may be that neglect specifically relates to anhedonia because it is more chronic in nature and stable over time compared to other forms of maltreatment (Proctor & Dubowitz, 2014). Within this theoretical framework, chronic stress would mediate the relation between neglect-exposure and reward processing by leading to more persistent patterns of stress-exposure, which can tax the dopaminergic system related to approach behaviors (Trew, 2011). Confounding this explanation, however, is emerging research that deficits in the stress response system may not adequately explain the consequences of deprivation exposure (Busso, McLaughlin, & Sheridan, 2017). Instead, it may be important for other mediating variables to be explored in explaining the effects of neglect. For instance, behavioral (Wisner Fries & Pollak, 2017) and neural (Mehta, Gore-Langton, Golemboski, Colvert, Williams, & Sonuga-Barke, 2010) indicators of reward learning, a key component of anhedonia (Pizzagalli, 2014), are

negatively associated with neglect-exposure. Thus, emotional neglect-exposure may directly impact reward processing via impaired learning, exacerbating levels of anhedonic symptoms in these vulnerable youth.

Emotional neglect not only predicted levels of anhedonia, but also predicted increases over time. This suggests that the harmful effects of emotional neglect may increase during the transition from adolescence to emerging adulthood. The adolescent-adult transition is marked by new, challenging developmental tasks related to independence and interpersonal relationships that are important to master in order to maintain and/or promote emotional well-being (Menon et al., 2018). Implicit and associative learning deficits in neglect-exposed youth may make it challenging for these adolescents to adjust to these new social roles (Geoffroy, Pereira, Li, & Power, 2016). Consistent with an organizational approach to psychopathology (Cicchetti & Toth, 2009), the inability to navigate developmentally-salient challenges leads to increased distress in subsequent developmental periods. The increasing trajectory of anhedonic symptoms associated with neglect-exposure in our study, therefore, may reflect the effects of not being able to engage positively with new developmental challenges in adolescence (e.g., building positive peer relationships), cascading into emerging adulthood.

Our findings replicated Van Veen and colleagues' (2013) results with adults, in that emotional abuse and neglect were independently associated with depressed mood, while sexual abuse and physical abuse were not. In a recent integrative model proposed by Luyten and Fonagy (2017) which extends motivational models of depression (e.g., approach-avoidance; Trew, 2011), the authors suggested that three biobehavioral systems underlie depression symptomatology: stress, reward, and social cognition (sometimes referred to as mentalization). We propose that similar to how emotional neglect may uniquely impact the reward system that underlies anhedonic presentations, emotional abuse and neglect may directly impact social cognition which leads to elevated depressed mood. Extant theory suggests that emotional maltreatment uniquely predicts depression because different than other maltreatment experiences, attributions about oneself are supplied directly by the perpetrator (Rose & Abramson, 1992). Within the context of emotional abuse, statements from the perpetrator (e.g., "you're stupid") can lead to a myriad of negative cognitive biases (Gibb, 2002) such as poor self-awareness—a key aspect of social cognition (Luyten & Fonagy, 2017). While patterns of emotional unavailability and unresponsiveness linked with emotional neglect may also indirectly communicate messages about one's self-worth, it is important to note that both subtypes of emotional maltreatment predicted depressed mood when tested simultaneously. This suggests that the reasons emotional abuse and emotional neglect impact social cognition, and subsequent depressed mood, may be distinct.

A possible reason that emotional neglect's impact on this risk pathway would be distinct from emotional abuse is that learning deficits that stem from emotional neglect can contribute towards impairment in social cognition as well as reward processing. Recent research suggests that cognitive deficits stemming from exposure to neglect are unique, and continuous through adolescence and adulthood (Geoffroy, Pereira, Li, & Power, 2016). Importantly, the structural and functional individual brain differences that underlie one's cognitive capacity also underpin individual differences in emotional intelligence (Hogeveen,

Salvi, & Grafman, 2016). Thus, while emotional abuse may be associated with social cognition due to exposure to negative attributions, emotional neglect may be linked with social cognition via broader cognitive deficits. Support for distinct pathways for emotional abuse and neglect contributing towards impaired social cognition could have significant implications in tailoring empirically supported youth social-emotional learning interventions aimed at reducing depressed mood (see Taylor, Oberle, Durlak, & Weissberg, 2017) to become more trauma-informed.

A significant strength of our study was the ability to test our aims across demographic differences. With regard to sex, we found that the effects of maltreatment were invariant for boys and girls. These findings replicate past findings on the moderating role of sex on maltreatment subtypes and depressive symptoms (e.g., Arnow et al., 2011). This furthers the argument that depression risk in females may be due to increased levels of interpersonal stressors experienced during adolescence (Hankin & Abramson, 2001) as opposed to sensitivity to maltreatment. As for race/ethnicity, we found some support for the “double jeopardy” hypothesis within the context of emotional maltreatment and anhedonia. Specifically, African-Americans reported elevated levels of anhedonic symptoms within the context of emotional abuse. Significant findings for anhedonia compared to depressed mood may be due to findings that African-Americans tend to express more anhedonic responses compared to their peers (Lu, Lindsey, Irsheid, & Nebbitt, 2017). However, we recommend using caution when interpreting these findings as the significant findings faded over time. This could mean that adolescence is a sensitive period for anhedonic responses in African-Americans exposed to emotional abuse or, and potentially more likely, a regression to the mean statistical effect was observed. Regardless of one’s interpretation of this finding, overall our study supports a “racial invariance” perspective (Widom et al., 2013) as race/ethnicity did not moderate other findings. Future research would benefit from focusing more on malleable individual differences that may moderate the maltreatment-depression relation as opposed to invariant demographic constructs.

While the diverse, large adolescent sample, and multi-wave longitudinal study design were significant strengths of our study, there are some notable limitations. First, we used a retrospective childhood maltreatment assessment. While retrospective reports of maltreatment are common and valid methods for indexing maltreatment-exposure (Kendall-Tacket & Becker-Blease, 2004), there are biases associated with this approach (Hardt & Rutter, 2004). Relatedly, we assessed maltreatment at age 18, following some of our assessments of depressive symptoms. Therefore, statements concerning the predictive validity of maltreatment is based on theoretical models positing depressive symptoms as a consequence of maltreatment. Second, our study used an unselected community sample to investigate the effects of maltreatment. While using child welfare samples have significant limitations (e.g., underestimates of reports for neglect; Proctor & Dubowitz, 2014), others caution against using community samples when investigating the consequences of emotional maltreatment (McCrory et al., 2017). Therefore, this study’s aims should be replicated within the context of a child welfare sample with substantiated experiences of child maltreatment. Finally, we only used a single, self-report measure of depression. Best practices recommend using a multi-informant approach when assessing depression to fully capture the breadth of symptoms (Klein, Dougherty, & Olino, 2005). This issue may be

especially relevant with regard to our two-item assessment of anhedonia as evidenced by lower levels of internal consistency. While short, self-report measures of anhedonia are commonly used in the literature (e.g., Bennik et al., 2014), a multi-method assessment can provide insight into which aspects of anhedonia may be particularly impaired within neglect-exposed youth.

Understanding the unique effects of specific childhood adversities holds great translational promise. Currently, empirically-based assessment and intervention strategies use a cumulative approach to childhood adversities. Inherently, these models treat neglect and emotional abuse as “stressors” within an overall victimization profile, and target consequences stemming from these experiences in a similar fashion (Lawson & Quinn, 2013). However, the current study is congruent with emerging developmental traumatology models (e.g., McCrory et al., 2017; McLaughlin et al., 2014) which suggest that the consequences stemming from specific forms of childhood adversities may be distinct. Specifically, the risk and type of depression secondary to maltreatment-exposure may vary as a function of whether one experiences abuse or neglect. These developmental models are consistent with recent depression models that suggest distinct pathways leading to the onset and maintenance of depression (e.g., Luyten & Fonagy, 2017; Trew, 2011) even at the symptom level (Hasler et al., 2004). Collectively, these models show how two different forms of maltreatment may differentially or simultaneously impact certain depressive presentations in adolescents. Ultimately, understanding which traumatic events contribute to specific depressive risk pathways and manifest symptoms can pave the way for a personalized medicine approach to trauma-informed mental health prevention and intervention approaches.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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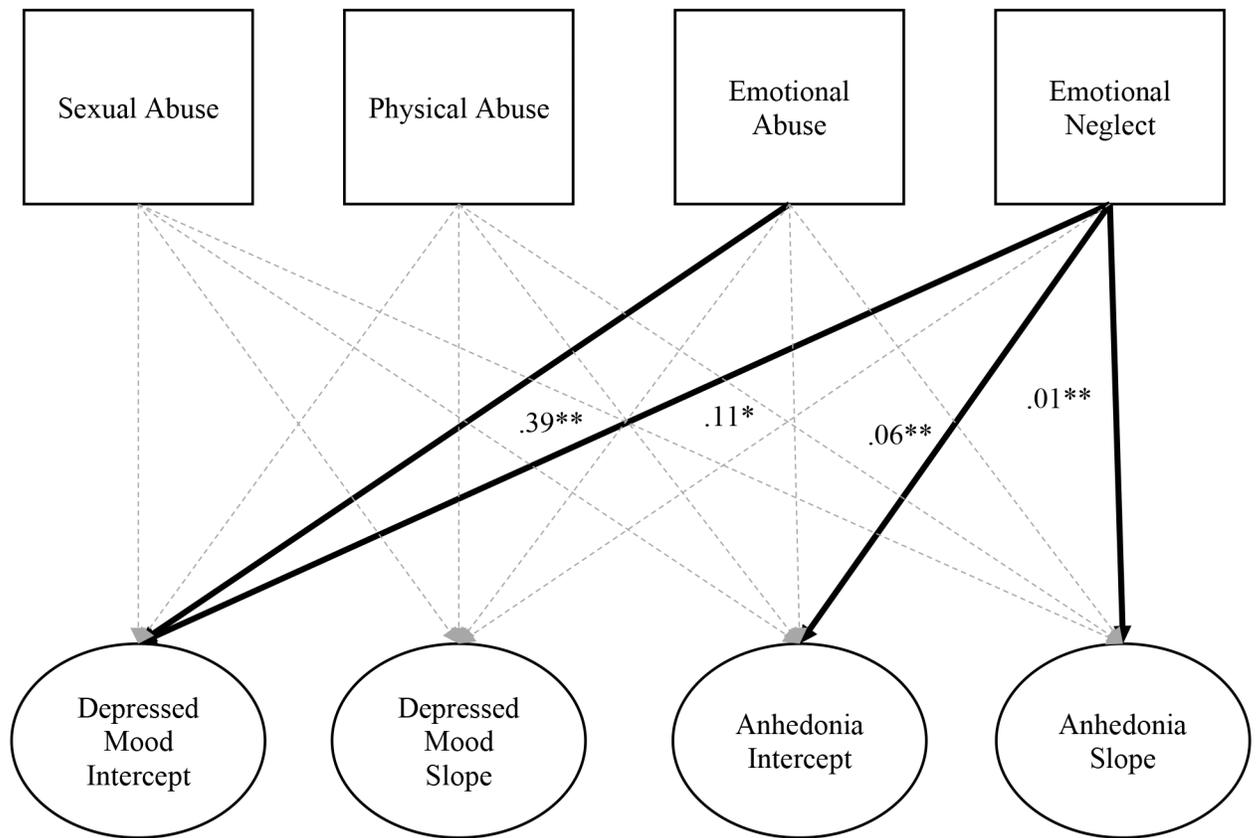
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**Clinical Impact Statement:**

Currently, empirically-based assessment and intervention strategies use a cumulative approach to childhood adversities. Inherently, these models treat neglect and emotional abuse as “stressors” within an overall victimization profile, and target consequences stemming from these experiences similarly. However, the current study suggests that the depressive consequences stemming from specific forms of childhood adversities may be unique. Specifically, the risk and type of depression secondary to maltreatment-exposure may vary as a function of subtype (i.e., emotional abuse versus emotional neglect). Understanding the specific effects of traumatic events can pave the way for tailoring clinical protocols for youth exposed to different maltreatment subtypes.



**Figure 1.**  
Model for Outcome Variables

Note: Model of the relation between maltreatment and depressive symptoms. Significant paths ( $p < .01$ ) are represented by solid black lines and non-significant paths ( $p > .01$ ) are represented by gray lines. Paths predicting anhedonia and depressed mood were examined between all maltreatment subtypes simultaneously. Correlations were examined between all predictor variables and for our endogenous variables (e.g., symptom slopes and intercepts), their disturbances. These correlations are not shown in order to enhance figure clarity. All maltreatment variables were derived from the Childhood Trauma Questionnaire-Short Form (Bernstein et al., 2003) and depressive symptom outcomes from the Center for Epidemiological Studies-Depression (CES-D) 10-item scale.  $*=p < .01$ ;  $**p < .001$

**Table 1.**

## Descriptive Statistics of Study Variables

	Mean	SD	N
Sexual Abuse	6.26	3.64	673
Physical Abuse	7.17	2.96	673
Emotional Neglect	10.70	5.10	673
Total Neglect	18.55	7.71	673
Depressed Mood (T1)	6.67	4.63	645
Anhedonia (T1)	2.22	1.59	668
Depressed Mood (T2)	6.84	4.81	627
Anhedonia (T2)	2.33	1.61	643
Depressed Mood (T3)	6.59	4.74	597
Anhedonia (T3)	2.24	1.56	608
Depressed Mood (T4)	6.81	5.02	588
Anhedonia (T4)	2.17	1.59	594
Depressed Mood (T5)	6.33	5.11	507
Anhedonia (T5)	2.43	1.75	510
Depressed Mood (T6)	6.48	5.25	548
Anhedonia (T6)	2.58	1.76	552

*Note:* Sexual Abuse = Childhood Trauma Questionnaire-Short Form (CTQ-SF)-Sexual Abuse Subscale; Physical Abuse = Childhood Trauma Questionnaire-Short Form (CTQ-SF)-Physical Abuse Subscale; Emotional Abuse = Childhood Trauma Questionnaire-Short Form (CTQ-SF)-Emotional Abuse Subscale; Emotional Neglect = Childhood Trauma Questionnaire-Short Form (CTQ-SF)-Emotional Neglect Subscale. Depressed Mood = Center for Epidemiologic Studies Depression Scale (CESD-10)-Depressed Mood Subscale; Anhedonia = Center for Epidemiologic Studies Depression Scale (CESD-10)- Anhedonia Subscale.